

Changing Climate Adaptation: Reforming Flood Management

Hurricane Science for Safety Leadership Forum

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American Rivers

Thriving By Nature

Every watershed has an historic range of water conditions

Dry



Wet

That range will increase with climate change

A shift in the average



Dry



Wet

More frequent
and intense
droughts

More frequent
and intense
storms

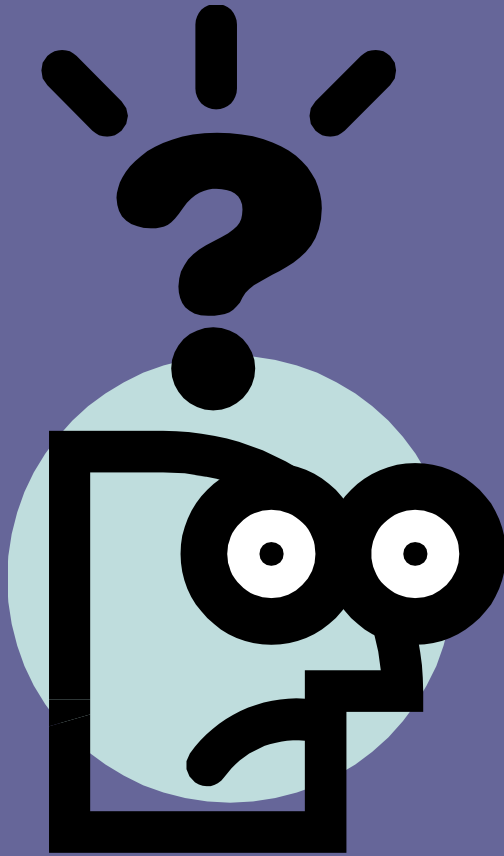
If we fail to arrest greenhouse gas emissions...



If we fail to arrest greenhouse gas emissions...

...the extremes will become catastrophic.





So if the climate is changing,
what can we do?

IGNORE!



MOVE!



ADAPT!



Levees, dams, and channels



Not very flexible...

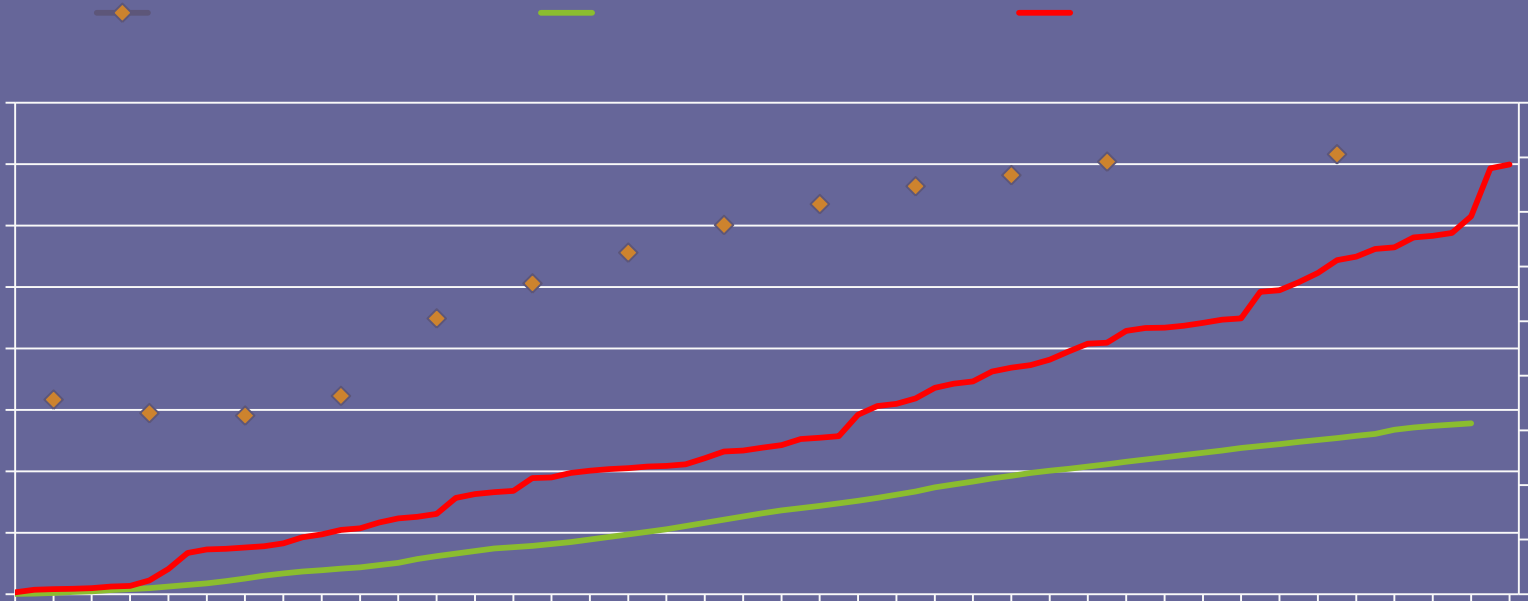


...or effective.



Chesterfield Valley, MO

Externalizing the cost of floodplain development...



...causes flood damages to grow

Natural defenses
are more
flexible...



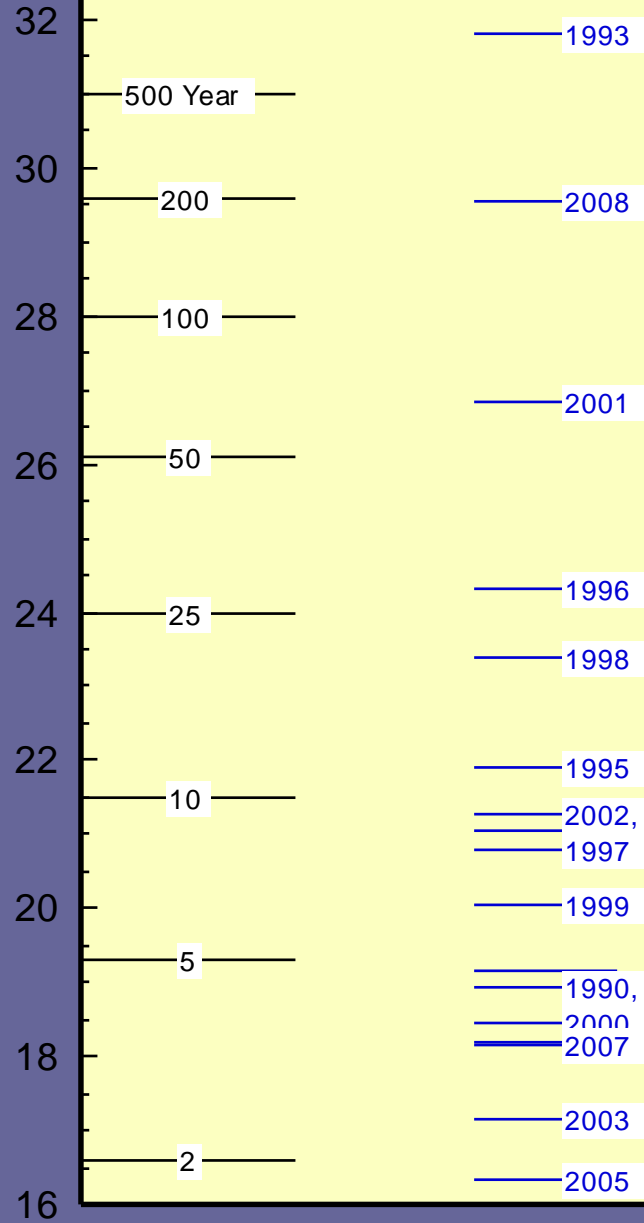
...and provide a
wider array of
benefits.

**Levees
should be a
last line of
defense.**



HANNIBAL, MO River Mile 309

STAGE, ft.



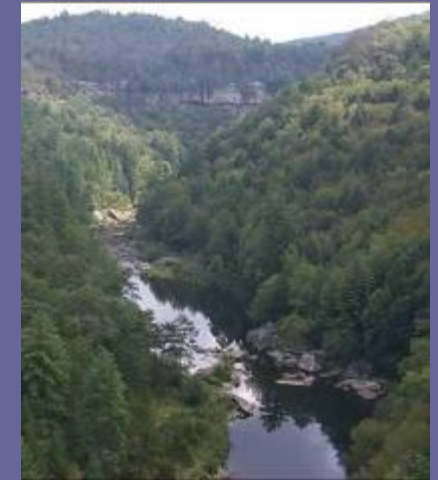
Vehicles of Change?

- National Flood Insurance Program
- American Clean Energy and Security Act
- American Recovery and Reinvestment Act
- Water Resources Development Act
- Farm Bill



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Sea Level Rise

IPCC (2007)	+ 0.6 to 1.9 feet by 2100
Projecting forward based on recent observations of Greenland and Antarctic melting (Pfeffer et al, 2008)	+ 2.6 to 6.6 feet by 2100
Projecting forward based on correlations between sea level and temperature for the past 2000 years (Grinsted et al., 2009)	+ 2.4 to 5.2 feet by 2090-2099
Sea level last time temperatures were 2 degrees F warmer than today	+16 feet
Sea level last time temperatures were 4 to 6 degrees F warmer than today	+80 feet

NFIP Reform

- Keep out of the hurricane business!
- Use climate models in all planning, including map revisions
- Establish rates based on risk
- Notify the public about “residual” risk behind levees and dams